REMARKS

Claims 1-10 remain pending in the instant application and stand ready for further action on the merits. The instant reply is in response to the Non-Final Office Action mailed on May 13, 2008.

Pending claims 1-10 considered together with the following remarks are believed sufficient to place the application into condition for allowance. Accordingly, an early and favorable action on the merits is earnestly solicited at present.

Amendment to the Specification

The Applicants have presently amended the specification by correcting an inadvertent error found therein. Specifically, the following amendment has been made:

Page 84, line 17: change "weight" to --molar amount--.

This amendment is apparent from the context of the sentence containing the amended portion. No new matter has been added.

Rejection Under 35 U.S.C. § 102

Claims 1-10 have been rejected under 35 U.S.C. § 102(b) as being anticipated by **Komiya *et al.* ('685),** EP 1048685.

Reconsideration and withdrawal of the above rejection is respectfully requested based on the following considerations.

Legal Standard For Anticipation

The standard for a rejection under 35 U.S.C. § 102(b) is established in MPEP §2131. A claim is anticipated only if each and every element as set forth in the claim is found, either

expressly or inherently described, in a single prior art reference. If an independent claim is allowable under 35 U.S.C. § 102, then any claim depending therefrom is also allowable.

The Present Invention

The claimed invention is drawn to a polymerizer device and a polymerizer which enable the production, by melt transesterification, of a high quality, high performance aromatic polycarbonate (which is colorless and has excellent mechanical properties) from a molten aromatic polycarbonate prepolymer obtained by reacting an aromatic dihydroxy compound with a diaryl carbonate, wherein the polycarbonate can be stably produced on a commercial scale.

The state of the art and the essential features and advantages of the present invention

Before specifically addressing the Examiner's rejection of the claims over the references, Applicants will explain the development of the present invention and the advantageous features thereof with reference to the present specification under "Prior Art".

With respect to aromatic polycarbonates and conventional methods for producing the same, the present specification describes as follows:

> *"[0003] In recent years, aromatic polycarbonates have been widely used in various fields as engineering plastics having excellent properties with respect to heat resistance, impact resistance, transparency and the like." (see page 2, lines 8-12 of the present specification).*

> *"[0005] As a method for producing an aromatic polycarbonate from an aromatic dihydroxy compound and a diaryl carbonate, a melt transesterification process has conventionally been known, in which an aromatic polycarbonate is produced by performing an ester exchange reaction between an aromatic dihydroxy compound (such as bisphenol A) and a diaryl carbonate (such as diphenyl carbonate) in the molten state, while removing an aromatic monohydroxy compound produced (such as phenol) from the equilibrium polycondensation reaction system." (see page 3, lines 15-24 of the present specification)*

"[0006] Various polymerizers have been known for use in producing aromatic polycarbonates by the melt transesterification process." (see page 5, lines 11-13 of the present specification)

As seen from the above-reproduced disclosure of the present specification, aromatic polycarbonates are useful as engineering plastics, and various polymerizer devices have been used for producing aromatic polycarbonates by the melt transesterification process.

As such a conventional polymerizer device, the present inventors developed a guide-wetting fall polymerizer device, and there are a number of patent documents disclosing methods using a guide-wetting fall polymerizer device. In this connection, attention is drawn to the following description of the present specification:

"Specifically, the present inventors developed methods using a guide-wetting fall polymerizer device in which a molten prepolymer is allowed to fall along and in contact with the surface of a guide, such as a wire, thereby effecting polymerization of the molten prepolymer to produce a desired polymer (see Unexamined Japanese Patent Application Laid-Open Specification No. Hei 8-225641, Unexamined Japanese Patent Application Laid-Open Specification No. Hei 8-225643, Unexamined Japanese Patent Application Laid-Open Specification No. Hei 8-325373, WO97/22650, Unexamined Japanese Patent Application Laid-Open Specification No. Hei 10-81741, Unexamined Japanese Patent Application Laid-Open Specification No. Hei 10-298279, ***WO99/36457****, and WO99/64492)."* ***(emphasis added)*** *(see page 10, lines 3-17 of the present specification).*

In connection with the above-reproduced passage of the present specification, it should be noted that the above-cited **WO99/36457** corresponds to **Komiya *et al.* ('685)** cited in the outstanding Office Action.

However, conventional guide-wetting fall polymerizer devices are still unsatisfactory from the viewpoint of a commercial scale production of an aromatic polycarbonate. Specifically, the present specification states as follows:

"[0014] However, none of the above-mentioned patent documents has any teaching or suggestion about a polymerizer device for producing an aromatic polycarbonate on a commercial scale at a rate of 1 t/hr or more. Further, it has been found that, even when the relatively small scale polymerizer devices

disclosed in the above-mentioned patent documents are used for producing an aromatic polycarbonate for a long period of time, it is possible that the resultant aromatic polycarbonate product sometimes contain a very small amount of a polymer mass having too high a molecular weight (such a polymer mass generally has a size of 1 mm or less and can be visually observed due to the difference in refractive index between the polymer mass and other portions of a sheet surrounding the polymer mass)." (see page 10, line 18 to page 11, line 7 of the present specification).

In this situation, the present inventors have made extensive and intensive studies with a view toward solving the problems accompanying the prior art and arrived at the present invention.

The object of the present invention is to provide a polymerizer device for stably producing a high quality, high performance aromatic polycarbonate at a rate of 1 t/hr or more for a long period of time (for example, a period of time as long as 5,000 hours or more). This object is described in more detail in the present specification as follows:

"[0015] It is a task of the present invention ***to provide a polymerizer device for stably producing****, from a molten aromatic polycarbonate prepolymer obtained by reacting an aromatic dihydroxy compound with a diaryl carbonate,* ***a high quality, high performance aromatic polycarbonate*** *which not only is colorless but also has excellent mechanical properties,* ***on a commercial scale at a rate of 1 t/hr or more for a long period of time****, wherein the molecular weight of the aromatic polycarbonate can be maintained at a desired level." (**emphasis added**) (see page 11, line 17 to page 12, line 1 of the present specification).*

In connection with the above-reproduced paragraph [0015] of the present specification, it should be noted that the term "long period of time" referred to therein means a period of several thousand hours (e.g., 5,000 hours) or more. This is apparent, for example, from the following description of the present specification:

"it has been desired to provide a polymerizer device for stably producing a very high quality aromatic polycarbonate on a commercial scale at a rate of 1 t/hr or more for ***a long period of several thousand hours or more (for example, a period of time as long as 5,000 hours or more)." (emphasis added)*** *(see page 11, lines 8-13 of the present specification).*

The object has been attained by a guide-wetting fall polymerizer device as defined in claim 1 of the present application, which has the following characteristics (1) to (5):

(1) The opening area (A) (m^2) of the horizontal cross section of the upper portion of the casing satisfies the following formula: $0.7 \leq A \leq 200$.

(2) The guide-wetting fall polymerizer device satisfies the following formula: $20 \leq A/B \leq 1{,}000$, wherein A is as defined above for the characteristic (1) and B represents a minimum opening area (m^2) of the cross section of the outlet.

(3) The angle (C) (°) between the upper peripheral side wall of the upper portion and the inner surface of the lower peripheral wall of the lower tapered portion, as measured with respect to a vertical cross section of the casing, satisfies the following formula: $120 \leq C \leq 165$.

(4) The length (h) (cm) of the guide satisfies the following formula: $150 \leq h \leq 3{,}000$.

(5) The total outer surface area (S1) (m^2) of the guide satisfies the following formula: $2 \leq S1 \leq 5{,}000$.

By virtue of the characteristics (1) to (5), the guide-wetting fall polymerizer device of the present invention enables the stable production of a high quality, high performance aromatic polycarbonate at a rate of 1 t/hr or more for a long period of several thousand hours (e.g., 5,000 hours) or more. This is described in the present specification as follows:

> *"[0038] It is surprising that* ***the use of a guide-wetting fall polymerizer device having the above-mentioned characteristics (1) to (5) has enabled the stable production of a high quality, high performance aromatic polycarbonate*** *which not only is colorless but also has excellent mechanical properties,* ***on a commercial scale at a rate of 1 t/hr or more for a long period of several thousands hours or more (for example, a period of time as long as 5,000***

> ***hours)**, wherein the molecular weight of the aromatic polycarbonate can be maintained at a desired level." **(emphasis added)** (see page 30, lines 15-25 of the present specification).*

Distinctions Over the Cited Art

Komiya *et al.* ('685)

Applicants disagree with the Examiner, because the Examiner's rejection appears to be based on her misunderstanding of the disclosure of Komiya *et al.* ('685). As explained below, the present invention is novel over Komiya *et al.* ('685).

At the outset, Applicants wish to emphasize that the first inventor of the present application, Dr. Shinsuke FUKUOKA, is an inventor of Komiya *et al.* ('685). Therefore, the present inventors fully understand the difference between the present application and Komiya *et al.* ('685).

Komiya *et al.* ('685) is directed to a method for producing an aromatic polycarbonate by the use of a guide-wetting fall polymerizer device (see claim 1 of Komiya *et al.* ('685)). The Examiner believes that the guide-wetting fall polymerizer device used in Komiya *et al.* ('685) has all of the characteristics (1) to (5) recited in claim 1 of the present application. However, in contrast at least the characteristics (1) to (3) are not disclosed in Komiya *et al.* ('685).

1. With respect to the characteristic (1) ($0.7 \leq A \leq 200$, wherein A represents the opening area (m^2) of the horizontal cross section of the upper portion of the casing).

According to the Examiner, the characteristic (1) is disclosed in paragraph [0057] of Komiya *et al.* ('685) (see page 4, lines 9-7 from bottom of the Office Action). However, paragraph [0057] of Komiya *et al.* ('685) does not teach the characteristic (1).

Paragraph [0057] of Komiya *et al.* ('685) reads as follows:

> *"[0057] There is no particular limitation with respect to the size of the wall-surface guide. The total **area of both surfaces of the wall-surface guide** is generally from 0.1 to 100 m^2, preferably 0.4 to 20 m^2." **(emphasis added)** (see page 12, lines 52-53 of EP 1048685)*

The above-reproduced paragraph [0057] of Komiya *et al.* ('685) refers to the size (more specifically, the total area of both surfaces) of the wall-surface guide. The size of the wall-surface guide has no relationship with the size of the horizontal cross section of the upper portion of the casing. Therefore, the description about the total area of both surfaces of the wall-surface guide in Komiya *et al.* ('685) gives no teaching about the range of the opening area (A) (m^2) of the horizontal cross section of the upper portion of the casing defined in the characteristic (1).

Thus, Komiya *et al.* ('685) does not teach the characteristic (1) recited in claim 1 of the present application.

2. With respect to the characteristic (2) ($20 \leq A/B \leq 1{,}000$, wherein A represents the opening area (m^2) of the horizontal cross section of the upper portion of the casing and B represents a minimum opening area (m^2) of the cross section of the outlet)

According to the Examiner, the characteristic (2) is disclosed in paragraphs [0055] to [0064] of Komiya *et al.* ('685) (see page 4, lines 6-3 from bottom of the Office Action). However, paragraphs [0055] to [0064] of Komiya *et al.* ('685) do not teach the characteristic (2).

Paragraphs [0055] to [0064] of Komiya *et al.* ('685) describe characteristics concerning the wall-surface guide used in the polymerizer device of Komiya *et al.* ('685). More specifically, these paragraphs of Komiya *et al.* ('685) explain the morphology, size, thickness and the like of the guide. For example, as explained above, paragraph [0057] of Komiya *et al.* ('685) describes the size of the guide.

However, such characteristics concerning the wall-surface guide has no relationship with the size of the horizontal cross section of the upper portion of the casing or the size of the cross section of the outlet. Therefore, the description of the characteristics concerning the wall-surface guide gives no teaching about the range of the ratio (A/B) defined in the characteristic (2), wherein A represents the opening area (m^2) of the horizontal cross section of the upper portion of the casing and B represents a minimum opening area (m^2) of the cross section of the outlet.

Thus, Komiya *et al.* ('685) does not teach the characteristic (2) recited in claim 1 of the present application.

3. With respect to the characteristic (3) ($120 \leq C \leq 165$, wherein C represents the angle (°) between the upper peripheral side wall of the upper portion and the inner surface of the lower peripheral wall of the lower tapered portion).

According to the Examiner, the characteristic (3) is disclosed in paragraphs [0055] to [0064] of Komiya *et al.* ('685) (see page 4, line 2 from bottom to page 5, line 3 of the Office Action). However, as explained above, paragraphs [0055] to [0064] of Komiya *et al.* ('685) describe the characteristics concerning the wall-surface guide used in the polymerizer device of Komiya *et al.* ('685). In contrast, the characteristics of the wall-surface guide has no relationship with the angle (C) between the upper peripheral side wall of the upper portion and the inner surface of the lower peripheral wall of the lower tapered portion, which is defined in the characteristic (3). Therefore, the description of the characteristics of the wall-surface guide does not give any teaching about the range of the angle (C).

Thus, Komiya *et al.* ('685) does not teach the characteristic (3) recited in claim 1 of the present application.

From the above, it is apparent that at least the characteristics (1) to (3) are not taught by Komiya *et al.* ('685). Thus, claim 1 is novel over Komiya *et al.* ('685).

Since the novelty of claim 1 over EP 1048685 has been established, the novelty of claims 2-10 over EP 1048685 is apparent, since claims 2-10 are directly or indirectly dependent from claim 1.

Arguments on the novelty of the claims 2, 5 and 7-10 over Komiya et al. ('685)

Applicants believe that the above argument has already overcome the anticipation rejection of the claims over Komiya *et al.* ('685). However, in connection with the novelty of claims 2, 5 and 7-10 over Komiya *et al.* ('685), Applicants wish to make the following supplementary arguments addressing the anticipation rejection of claims 2, 5 and 7-10 over Komiya *et al.* ('685).

Claim 2

In the guide-wetting fall polymerizer device of claim 2 of the present application, the upper portion of the casing is cylindrical, the lower tapered portion of the casing is reverse conical, and the outlet is cylindrical, wherein the inner diameter (D) (cm) of the upper portion, the length (L) (cm) of the upper portion, the inner diameter (d) (cm) of the outlet and the length (h) (cm) of the guide satisfy the following formulae: $100 \leq D \leq 1{,}000$; $5 \leq D/d \leq 50$; $0.5 \leq L/D \leq 30$; and $h - 20 \leq L \leq h + 300$.

According to the Examiner, the features of claim 2 are disclosed in Tables 1 and 2 of Komiya *et al.* ('685) (see page 5, lines 13-3 from bottom of the Office Action). However, Tables 1 and 2 of Komiya *et al.* ('685) have no teaching about the features defined by the four formula ($100 \leq D \leq 1{,}000$; $5 \leq D/d \leq 50$; $0.5 \leq L/D \leq 30$; and $h - 20 \leq L \leq h + 300$) recited in claim 2.

Therefore, claim 2 is novel over EP 1048685.

Claim 5

With respect to claim 5 of the present application, the Examiner states that "See figure 1 number 4 is directed to a plurality of nets" (see page 6, lines 7-10 of the Office Action). However, there is no "number 4" in Fig. 1 of Komiya *et al.* ('685). Therefore, the Examiner's rejection of the novelty of claim 5 has not met the legal requirements.

Thus, the rejection of the novelty of claim 5 over Komiya *et al.* ('685) should be withdrawn.

Claim 7

The guide-wetting fall polymerizer device of claim 7 of the present application has connected thereto at least one additional guide-wetting fall polymerizer device having the characteristics (1) to (5). Therefore, in the embodiment of claim 7, two or more guide-wetting fall polymerizer devices having the characteristics (1) to (5) are used.

According to the Examiner, the features of claim 7 are disclosed in page 13, lines 1-3 and paragraph [0060] of Komiya *et al.* ('685) (see page 6, lines 4-1 from bottom of the Office

Action). However, as explained below, the Examiner's cited portions of Komiya *et al.* ('685) have no description about the use of two or more guide-wetting fall polymerizer devices.

Page 13, lines 1-3 and paragraph [0060] of Komiya *et al.* ('685) describe characteristics concerning the size of the wall-surface guide used in a single guide-wetting fall polymerizer device. More specifically, page 13, lines 1-3 and paragraph [0060] of Komiya *et al.* ('685) give an explanation on the range of the ratio (S_1/S_0), wherein S_0 represents the total area of both surfaces of the wall-surface guide, as measured without perforation, and S_1 represents the total area of the openings in both surfaces of the wall-surface guide.

Therefore, it is apparent that the description of page 13, lines 1-3 and paragraph [0060] of Komiya *et al.* ('685), cited by the Examiner does not teach the features of claim 7.

Thus, claim 7 is novel over Komiya *et al.* ('685).

Claim 8

For the Examiner's convenience, claim 8 of the present application is reproduced below:

> *"8. The polymerizer device according to claim 7, which has one additional guide-wetting fall polymerizer device connected thereto, and wherein said total outer surface area (S1) (m^2) of the guide used in said guide-wetting fall polymerizer device and the total outer surface area (S2) (m^2) of the guide used in said additional guide-wetting fall polymerizer device satisfy the following formula:*
>
> $1 \leq S1/S2 \leq 20.$"

As seen from the above-reproduced description, in the embodiment of claim 8, two guide-wetting fall polymerizer devices having the characteristics (1) to (5) are used, wherein the total outer surface area ratio between the guides used in the two guide-wetting fall polymerizer devices are within a specific range.

According to the Examiner, the features of claim 8 are disclosed in page 13, lines 1-3 and paragraph [0060] of Komiya *et al.* ('685) (see page 7, lines 1-7 of the Office Action). However, as explained above in connection with the novelty of claim 7, the Examiner's cited portions of Komiya *et al.* ('685) which describe characteristics concerning the size of the wall-surface guide

used in a single guide-wetting fall polymerizer device, and has no teaching about the use of two guide-wetting fall polymerizer devices or the total outer surface area ratio between the guides used in the two guide-wetting fall polymerizer devices.

Therefore, claim 8 is novel over Komiya *et al.* ('685).

Claim 9

The Examiner believes that claim 9 of the present application has a feature concerning the amount of a halogen atom or specific metal compound in an aromatic polycarbonate (see page 7, lines 8-12 of the Office Action). However, in contrast, the cited refrence does not teach this limitation. Therefore, the Examiner's rejection of the novelty of claim 9 has not met the legal requirements.

Thus, the rejection of the novelty of claim 9 over Komiya *et al.* ('685) should be withdrawn.

Claim 10

According to the Examiner, claim 10 of the present application is directed to an aromatic polycarbonate comprising a plurality of aromatic polycarbonate main chains (see page 7, lines 13-15 of the Office Action). However, contrary to the Examiner's basis for this rejection, claim 10 does not have such feature. Therefore, the Examiner's rejection of the novelty of claim 10 has not met the legal requirements.

Thus, the rejection of the novelty of claim 10 over Komiya *et al.* ('685) should be withdrawn.

Claims 3 and 6 depend upon the claims analyzed above, therefore if the base claim is novel, all the dependent claims should also be novel.

Claim Rejection Under 35 USC § 103(a)

Claims 1-4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Komiya *et al.* ('609)** (US 5747609) in view of **Komiya *et al.* ('685)** (see pages 8-10 of the Office Action).

Reconsideration and withdrawal of the above rejection is respectfully requested based on the following considerations.

Legal Standard for Determining Prima Facie Obviousness

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

"There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." *In re Rouffet,* 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obvious was held improper.).

"In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee,* 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The Supreme Court of the United States has recently held that the teaching, suggestion, motivation test is a valid test for obviousness, but one which cannot be too rigidly applied. See *KSR Int'l Co. v Teleflex Inc.*, 127 SCt 1727, 82 USPQ2d 1385 (U.S. 2007). The Supreme Court in *KSR Int'l Co. v. Teleflex, Inc.*, *ibid.,* reaffirmed the Graham factors in the determination of obviousness under 35 U.S.C. § 103(a). The four factual inquiries under Graham are:

(a) determining the scope and contents of the prior art;

(b) ascertaining the differences between the prior art and the claims in issue;

(c) resolving the level of ordinary skill in the pertinent art; and

(d) evaluating evidence of secondary consideration.

Graham v. John Deere, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (U.S. 1966).

The Court in *KSR Int'l Co. v. Teleflex, Inc., supra.,* did not totally reject the use of "teaching, suggestion, or motivation" as a factor in the obviousness analysis. Rather, the Court recognized that a showing of "teaching, suggestion, or motivation" to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 U.S.C. § 103(a).

Even so, the Court in *KSR Int'l Co. v. Teleflex, Inc., ibid.,* rejected a rigid application of the "teaching, suggestion, or motivation" (TSM) test, which required a showing of some teaching, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the prior art elements in the manner claimed in the application or patent before holding the claimed subject matter to be obvious.

Accordingly, while the courts have adopted a more flexible teaching, suggestion, motivation (TSM) test in connection with the obviousness standard based on the *KSR v. Teleflex* case, which case involved a mechanical device in a relatively predictable technological area, it remains true that, despite this altered standard, the courts recognize inventors face additional barriers in relatively unpredictable technological areas as noted in *Takeda Chemical Industries, Ltd. v. Alphapharm Pty., Ltd.*, 83 USPQ2d 1169 (Fed. Cir. 2007).

Further, the Examiner bears the initial burden of presenting a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

"[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336, quoted with approval in *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

Distinctions Over the Cited Art

Applicants contend that the arguments described above with respect to distinctions over the Komiya *et al.*('685) reference is equally applicable here (and are incorporated herein by reference in their entirety). At the outset, the Applicants wish to emphasize the following. The first inventor of the present application, Dr. Shinsuke FUKUOKA, is an inventor of Komiya *et al.* ('609). Further, as mentioned above, he is also an inventor of Komiya *et al.* ('685). Therefore, the present inventors fully understand the difference between the present application and Komiya *et al.* ('609) (US 5747609) and Komiya *et al.* ('685).

In her reasoning for the obviousness rejection, the Examiner refers to the description of column 21, lines 45-65; column 25, lines 43-64; and a portion (containing polymerizers 91 and 98) of Fig. 1 of Komiya *et al.* ('609), and states as follows:

> *"Note Komiya et al. ('609)discloses in col. 25 lines 18-col. 26 line 3 a molten prepolymer which is polymerized and flows through a guide wetting fall (98) in example 1 and figure 1 (98) which* ***reads on features (I) and (II) in applicants claims except for the parameters of applicants' claims 1-4 and 8." (emphasis added)*** *(see page 8, lines 13-16 of the Office Action)*
>
> *[**Applicants' note**: The Examiner's expression "feature (I)" or "feature (II)" is never used in the claims of the present application.]*

Based on this recognition on the disclosure of Komiya *et al.* ('609), the Examiner further states as follows:

> *"Thus, the reference discloses a method for producing an aromatic polycarbonate using a guide wetting fall device (after a series of distillation columns etc.) prepared from the same components as claimed by applicants* ***except for the particular description of the parameters of the polymerization vessel or guide wetting fall device, i.e. characteristics (1)-(5) as claimed in claims 1, 2, 3, 4 and 8 of applicants' claimed invention".***
>
> *First, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ particular amounts and/or parameters as known in the art, since Komiya et al. ('685)* ***discloses the use of a guide wetting fall device having the same parameters as claimed. Note pages 12-15 and figure 3a.*** *Further, it is prima facie obvious to determine workable or optimal values within a prior art disclosure through the application of routine experimentation."* ***(emphasis added)*** *(see page 9, line 7 from bottom to page 10, line 5 of the Office Action)*

The Applicants wish to traverse the above rejection as follows.

Komiya et al. ('609) and Komiya et al. ('685) do not teach or suggest the essential features of the guide-wetting fall polymerizer device of the present invention, even these references are taken in combination

The Examiner states that the guide-wetting fall polymerizer device used in Komiya *et al.* ('609) has all the features of the guide-wetting fall polymerizer device of the present invention, except for the characteristics (1) to (5) recited in claim 1 of the present application.

In connection with the Examiner's statement, Applicants note that Komiya *et al.* ('609) may teach the characteristic (4). Specifically, Komiya *et al.* ('609) has a description reading "The wire-wetting fall distance is 8 m" (see column 26, lines 5-6 of Komiya *et al.* ('609)). The "wire-wetting distance" may correspond to the length of the guide defined in the characteristic (4). If so, the value (8 m) described in Komiya *et al.* ('609) falls within the range (150 to 3,000 cm) described in the characteristic (4) and, hence, Komiya *et al.* ('609) teaches the characteristic (4).

However, with respect to at least the characteristics (1) to (3) and (5), these characteristics are not taught or suggested by Komiya *et al.* ('609).

Also, the Examiner states that the guide-wetting fall polymerizer device used in EP 1048685 has all the features of the guide-wetting fall polymerizer device of the present

invention, including the characteristics (1) to (5) recited in claim 1 of the present application. However, as explained above, at least the characteristics (1) to (3) are not taught or suggested by Komiya *et al.* ('685).

Therefore, it is apparent that at least the characteristics (1) to (3) recited in claim 1 are not taught or suggested by Komiya *et al.* ('609) or Komiya *et al.* ('685). Thus, Komiya *et al.* ('609) and Komiya *et al.* ('685) do not teach or suggest the essential features of the guide-wetting fall polymerizer device of the present invention, even these references are taken in combination.

The problem identified and solution/advantage of the present invention are completely different from those of Komiya et al. ('609)

As explained above, the object of the present invention is to provide a polymerizer device for stably producing a high quality, high performance aromatic polycarbonate at a rate of 1 t/hr or more for a long period of several thousand hours (e.g., 5,000 hours) or more. The object of the present invention is attained by a guide-wetting fall polymerizer device as defined in claim 1 of the present application, which has the characteristics (1) to (5).

On the other hand, the object of Komiya *et al.* ('609) is to provide a method for stably producing an aromatic polycarbonate having improved melt stability at high temperatures. This is apparent from the following description of Komiya *et al.* ('609):

> "*Accordingly, it is a primary object of the present invention to* ***provide a novel method for stably producing an aromatic polycarbonate having improved melt stability at high temperatures*** *on a commercial scale, which comprises reacting a dialkyl carbonate with phenol to obtain diphenyl carbonate, and polymerizing the obtained diphenyl carbonate with an aromatic dihydroxy compound.*" ***(emphasis added)*** *(see column 5, lines 17-23 of Komiya et al. ('609)).*

The object of Komiya *et al.* ('609) is attained by the method of claim 1 of Komiya *et al.* ('609), which is characterized in that 70 to 99 % by weight of phenol used as the raw material for producing diphenyl carbonate is the phenol produced as a by-product in the polymerization reaction for producing an aromatic polycarbonate from an aromatic dihydroxy compound and the diphenyl carbonate. For easy reference, claim 1 of Komiya *et al.* ('609) is reproduced below.

"1. A method for producing an aromatic polycarbonate, which comprises:

feeding a feedstock dialkyl carbonate and ***a feedstock phenol mixture of phenol (a) and phenol (b)*** *which is different in supply source from said phenol (a) to a reactor* ***to effect a reaction between said feedstock dialkyl carbonate and said feedstock phenol mixture*** *in the presence of a catalyst, thereby* ***producing diphenyl carbonate****, and*

polymerizing said diphenyl carbonate with an aromatic dihydroxy compound in a polymerizer to ***produce an aromatic polycarbonate while producing phenol as a by-product,***

wherein said by-product phenol is used as said phenol (b), and wherein ***the content of said phenol (b) in said feedstock phenol mixture is from 70 to 99% by weight.*** *" (emphasis added)*

Therefore, the problem identified and solution/advantage of the present invention are completely different from those of Komiya *et al.* ('609).

Further, the effects achieved in Komiya *et al.* ('609) concerning the production scale and stable production period of the aromatic polycarbonate are very small as compared to the case of the present invention. That is, in the method of Komiya *et al.* ('609), the rate at which the aromatic polycarbonate is produced and the period for which the aromatic polycarbonate is stably produced are very small or short as compared to the case of the present invention. On this point, a detailed explanation is given below.

With respect to the rate at which the aromatic polycarbonate is produced, Komiya *et al.* ('609) has the following description:

"while ***withdrawing the produced aromatic polycarbonate*** *from the bottom of wire-wetting polymerizer 98* ***at a flow rate of 4.3 kg/hr.*** *" (emphasis added) (see column 26, lines 10-13 of Komiya et al. ('609)).*

The rate (4.3 kg/hr) at which the aromatic polycarbonate is produced in Komiya *et al.* ('609) is very small as compared to the rate (1 t/hr or more) achieved in the present invention.

With respect to the period for which the aromatic polycarbonate is stably produced, Komiya *et al.* ('609) has the following description:

> *"**During 700 hours of the operation time** of the system of FIG. 1, both the operation for producing diphenyl carbonate and the operation for polymerization **were stably conducted** (for example, both of the flow and the composition in each conduit were stable) without suffering disadvantageous phenomena, such as deposition of the catalyst on the inner wall of the apparatuses and clogging of the conduits and the like." **(emphasis added)** (see column 26, lines 51-58 of USP 5747609).*

The stable production period (700 hours) achieved in Komiya *et al.* ('609) is very short as compared to the stable production period (several thousand hours (e.g., 5,000 hours) or more) achieved in the present invention.

Therefore, the effects achieved in Komiya *et al.* ('609) concerning the production scale and stable production period of the aromatic polycarbonate are very small as compared to the case of the present invention.

Thus, it is impossible to arrive at the present invention from the disclosure of Komiya *et al.* ('609).

The problem identified and solution/advantage of the present invention are completely different from those of Komiya et al. ('685)

As explained above, the object of the present invention is to provide a polymerizer device for stably producing a high quality, high performance aromatic polycarbonate at a rate of 1 t/hr or more for a long period of several thousand hours (e.g., 5,000 hours) or more. The object of the present invention is attained by a guide-wetting fall polymerizer device as defined in claim 1 of the present application, which has the characteristics (1) to (5).

On the other hand, the object of Komiya *et al.* ('685) is to provide a method for stably producing an aromatic polycarbonate having a desired constant molecular weight at a high polymerization rate, without discoloration with respect to the polymer or generation of foreign matter. This is apparent from the following description of Komiya *et al.* ('685):

> *"[0018] Therefore, it is an object of the present invention to provide a commercially advantageous method for producing an aromatic polycarbonate, which is free from the above-mentioned problems accompanying the conventional methods and* ***enables an aromatic polycarbonate having a desired constant molecular weight to be stably produced at a high polymerization rate, without discoloration with respect to the polymer or generation of foreign matter."*** *(**emphasis added**) (see page 4, lines 39-42 of Komiya et al. ('685)).*

The object of Komiya *et al.* ('685) is attained by the method of claim 1 of Komiya *et al.* ('685), which uses a guide-wetting fall polymerizer device having, as a guide, a perforated wall-surface guide. For easy reference, claim 1 of Komiya *et al.* ('685) is reproduced below.

> *"1. A method for producing an aromatic polycarbonate, which comprises:*
> . . .
> . . . ***to effect a guide-wetting fall polymerization*** *of said polymerizable material, thereby obtaining a polymer at a bottom of said guide-wetting fall polymerization reaction zone,*
> *wherein* ***said guide is a perforated wall-surface guide,***
> ***said perforated wall-surface guide having a plurality of through-holes, each extending substantially in the thicknesswise direction of said wall-surface guide, to thereby form openings in both surfaces of said wall-surface guide."*** *(**emphasis added**).*

Therefore, the problem and solution of the present invention are completely different from those of Komiya *et al.* ('685).

Further, the effects achieved in Komiya *et al.* ('685) concerning the production scale and stable production period of the aromatic polycarbonate are very small as compared to the case of the present invention. That is, in the method of Komiya *et al.* ('685), the rate at which the aromatic polycarbonate is produced and the period for which the aromatic polycarbonate is stably produced are very small or short as compared to the case of the present invention. On this point, a detailed explanation is given below.

With respect to the rate at which the aromatic polycarbonate is produced, Komiya *et al.* ('685) has the following description:

> *"For example, when it is intended to* ***produce an aromatic polycarbonate at a production rate of 100 kg/per hour****, the distributing plate should generally have 10 to 10^5 holes."* ***(emphasis added)*** *(page 14, lines 43-45 of Komiya et al. ('685)).*

The rate (100 kg/hr) at which the aromatic polycarbonate is produced in Komiya *et al.* ('685) is very small as compared to the rate (1 t/hr or more) achieved in the present invention.

In this connection, it should be noted that the rate which at which the aromatic polycarbonate is actually achieved in Komiya *et al.* ('685) is much smaller than the above-mentioned rate of 100 kg/hr. The Examiner's attention is drawn to the following description of Komiya *et al.* ('685).

> *"[0095] The* ***obtained molten prepolymer was continuously fed to polymerizer 5 through inlet 6 at a flow rate of 20 kg/hr*** *and allowed to fall along and in contact with perforated wall-surface guides 1, so that a polymerization reaction of the molten prepolymer was carried out . . ."* ***(emphasis added)*** *(page 17, lines 14-16 of Komiya et al. ('685)).*

In the above-reproduced description of Komiya *et al.* ('685), a prepolymer is fed at a rate of 20 kg/hr. The rate at which the desired aromatic polycarbonate is obtained is smaller than 20kg/hr, because phenol is produced and removed from the prepolymer.

As seen from the above, the rate (100 kg/hr, or a value smaller than 20 kg/hr) achieved in Komiya *et al.* ('685) is very small as compared to the rate (1 t/hr or more) achieved in the present invention.

With respect to the period for which the aromatic polycarbonate is stably produced, Komiya *et al.* ('685) has the following description:

> *"[0097] The aromatic* ***polycarbonate obtained 50 hours after the start of the polymerization reaction*** *was colorless and transparent (b*-value: 3.4), and the content of the foreign matter (having a diameter of from 0.5 to 20 μm) in the aromatic polycarbonate was as low as . . ."* ***(emphasis added)*** *(page 17, lines 24-26 of Komiya et al. ('685)).*

[Applicants' note: The same description is also found in paragraphs [0101], [0104], [0111] and [0116] of Komiya *et al.* ('685).]

The stable production period (50 hours) achieved in Komiya *et al.* ('685) is very short as compared to the stable production period (thousand hours (e.g., 5,000 hours) or more) achieved in the present invention.

Therefore, the effects achieved in Komiya *et al.* ('685) concerning the production scale and stable production period of the aromatic polycarbonate are very small as compared to the case of the present invention.

Thus, it is impossible to arrive at the present invention from the disclosure of Komiya *et al.* ('685).

From the above, it is apparent that claim 1 is patentable over Komiya *et al.* ('609) and Komiya *et al.* ('685), taken alone or in combination.

Now that the patentability of claim 1 over Komiya *et al.* ('609) and Komiya *et al.* ('685) has been established, the patentability of claims 2-10 over Komiya *et al.* ('609) and Komiya *et al.* ('685) is also apparent, since claims 2-10 are directly or indirectly dependent from claim 1.

Distinctions over the disclosure of Komiya et al. ('609)

The Examiner cites column 25, lines 43-64 of Komiya *et al.* ('609) (see page 9, the first paragraph of the Office Action), which describes a free-fall polymerizer indicated by reference numeral 91 in Fig. 1 of Komiya *et al.* ('609). The Examiner seems to regard the free-fall polymerizer as a guide-wetting fall polymerizer device as used in the present invention. However, as explained below, the free-fall polymerizer is not a guide-wetting fall polymerizer device.

From the Examiner's cited column 25, lines 43-64 of Komiya *et al.* ('609), the following portion is excerpted:

> *"In free-fall polymerizer 91, prepolymer (c) fed to the feeding zone (having perforated plate 90) from conduit 89 was **allowed to** pass through perforated plate 90 and **fall freely** in the form of filaments 92 to perform a free fall polymerization . . ." **(emphasis added)** (see column 25, lines 46-50 of Komiya et al. ('609)).*

As apparent from the above-excerpted portion, a prepolymer in the free-fall polymerizer is allowed to fall freely, differing from the case of a prepolymer in a guide-wetting fall polymerizer device, in which the polymerizer is allowed to fall along and in contact with the surface of a guide.

Thus, the free-fall polymerizer is not a guide-wetting fall polymerizer device.

Accordingly, the present invention is *not* rendered obvious from the combination of **Komiya *et al.* ('609)** (US 5747609) in view of **Komiya *et al.* ('685).**

Rejection on the ground of provisional double patenting

Claims 1-6 of the present application are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-3 of copending Application No. 10/592,394 (see pages 10-11 of the Office Action).

However, the Examiner's cited Application No. 10/592,394, which does not qualify as a reference for the rejection on the ground of provisional double patenting, because there is no common assignee or common inventor between Application No. 10/592,394 and the present application, and the invention of Application No. 10/592,394, which is directed to a SIP network element, is different and unrelated to a polymerizer device as claimed in the present application. For the Examiner's convenience, Applicants attach hereto a copy of the cover page of US 2007/0133440 A1, as which Application No. 10/592,394 is published.

Conclusion

From the foregoing, it is firmly believed that all of the Examiner's rejections have been overcome. Early and favorable action is respectfully solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Eggerton A. Campbell, Reg. No. 51,307, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

#28977

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